



FIG. 6A

CLUSTAL W (1.7) Multiple Sequence Alignments

Sequence type explicitly set to Protein
Sequence format is Pearson

| | | | | | | |
|-------------|---|--------|-----|----------|---------------------------------|--------|
| B. subtilis | Coax (SEQ ID NO:2) | 258 aa | sp | O51477 | B. burgdorferi (SEQ ID NO:11) | 262 aa |
| dbj | BAA21476.1 D. vulgaris (SEQ ID NO:59) | 212 aa | sp | P74045 | Synechocystis (SEQ ID NO:13) | 257 aa |
| gb | AAD35964.1 T. maritima (SEQ ID NO:9) | 246 aa | sp | O25533 | H. pylori (SEQ ID NOS:14 or 67) | 223 aa |
| pir | T36391 S. coelicolor (SEQ ID NO:4) | 265 aa | sp | O67753 | A. aeolicus (SEQ ID NO:12) | 229 aa |
| sp | Q45338 B. pertussis (SEQ ID NO:15) | 267 aa | sp | Q9RX54 | D. radiodurans (SEQ ID NO:8) | 262 aa |
| sp | O06282 M. tuberculosis (SEQ ID NO:5) | 272 aa | WIT | RCA03301 | C. acetobutylicum (SEQ ID NO:3) | 250 aa |
| gb | O93446 T. pallidum (SEQ ID NO:10) | 273 aa | WIT | RRC02473 | R. capsulatus (SEQ ID NO:6) | 258 aa |

| | | | | | | |
|-------------|--|--|--|--|--|--|
| B. subtilis | Coax (SEQ ID NO:2) | | | | | |
| WIT | RCA03301 C. acetobutylicum (SEQ ID NO:3) | | | | | |
| pir | T36391 S. coelicolor (SEQ ID NO:4) | | | | | |
| sp | O06282 M. tuberculosis (SEQ ID NO:5) | | | | | |
| WIT | RRC02473 R. capsulatus (SEQ ID NO:6) | | | | | |
| dbj | BAA21476.1 D. vulgaris (SEQ ID NO:59) | | | | | |
| sp | Q9RX54 D. radiodurans (SEQ ID NO:8) | | | | | |
| gb | AAD35964.1 T. maritima (SEQ ID NO:9) | | | | | |
| gb | O93446 T. pallidum (SEQ ID NO:10) | | | | | |
| sp | O51477 B. burgdorferi (SEQ ID NO:11) | | | | | |
| sp | O67753 A. aeolicus (SEQ ID NO:12) | | | | | |
| sp | P74045 Synechocystis (SEQ ID NO:13) | | | | | |
| sp | O25533 H. pylori (SEQ ID NOS:14 or 67) | | | | | |
| sp | Q45338 B. pertussis (SEQ ID NO:15) | | | | | |

| | | | | | | |
|--|--|--|--|--|--|--|
| -----MLLVIDVGNTNTVLGVYHDG-----KLEYHWRIE | | | | | | |
| NKRAAFMLLLFLRSVLKVLVLDVGNTNIVLGIYNDT-----KLTAEWRLS | | | | | | |
| -----MLLTIDVGNTHTVLGLFDGE-----DIVEHWRIS | | | | | | |
| -----MLLAIDVRNTHTVVGLLSGMKEHAKVVQQWRIR | | | | | | |
| -----MLLCIDCGNTNTVFSVWDGT-----DFAATWRIA | | | | | | |
| -----MTQHFLFLFDIGNTNVKIGIAVET-----AVLTSYVLP | | | | | | |
| -----MPAFPLLAVDIGNTTTVLGLADASG-----ALHTWTRIR | | | | | | |
| -----MYLLVDVGNTHSVFSITEDG-----KTFRRWRLS | | | | | | |
| -----MLLIDVGNSHVVFQIGENGGRVCVRELFRLA | | | | | | |
| -----MNKPLLSELIIDIGNTSIAFALFKDN-----QVNLFIKMK | | | | | | |
| -----MRFLTVDVGNSSSVDIALWEGK-----KVK | | | | | | |
| -----METSKEPGCGLALDNDKQKPWLGLMIGN-----SRLHWAYC | | | | | | |
| -----MPARQSFTDLKN-----LVLCDIGN-----TR | | | | | | |
| -----MIILDSGNSRLKVGWFDPPDAP---QAAREPAPV | | | | | | |

FIG. 6B

B. subtilis | Coax (SEQ ID NO:2)
WIT | RCA03301 | C. acetobutylicum (SEQ ID NO:3)
pir | T36391 | S. coelicolor (SEQ ID NO:4)
sp | O06282 | M. tuberculosis (SEQ ID NO:5)
WIT | RRC02473 | R. capsulatus (SEQ ID NO:6)
dbj | BAA21476.1 | D. vulgaris (SEQ ID NO:59)
sp | Q9RX54 | D. radiodurans (SEQ ID NO:8)
gb | AAD35964.1 | T. maritima (SEQ ID NO:9)
gb | O93446 | T. pallidum (SEQ ID NO:10)
sp | O51477 | B. burgdorferi (SEQ ID NO:11)
sp | O67753 | A. aeolicus (SEQ ID NO:12)
sp | P74045 | Synechocystis (SEQ ID NO:13)
sp | O25533 | H. pylori (SEQ ID Nos:14 or 67)
sp | Q45338 | B. pertussis (SEQ ID NO:15)

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WIT | RRC02473 | R. capsulatus (SEQ ID NO:6)
dbj | BAA21476.1 | D. vulgaris (SEQ ID NO:59)
sp | Q9RX54 | D. radiodurans (SEQ ID NO:8)
gb | AAD35964.1 | T. maritima (SEQ ID NO:9)
gb | O93446 | T. pallidum (SEQ ID NO:10)
sp | O51477 | B. burgdorferi (SEQ ID NO:11)
sp | O67753 | A. aeolicus (SEQ ID NO:12)
sp | P74045 | Synechocystis (SEQ ID NO:13)
sp | O25533 | H. pylori (SEQ ID Nos:14 or 67)
sp | Q45338 | B. pertussis (SEQ ID NO:15)

TSRHKTEDEFGMILRSLFDHS---GLMFEQIDGIIISSVVPPIMFALER
TDVLRSADEYGIQVMNLFQQD---KLDPTLVEGVIISSVVPNIMYSLEH
TDSRRTADELAVLLQGLMGMPHLLGDELGDGIDGIAICATVPSVLHELRE
TESEVTADELALTIDGLIG-----EDSERLTGTAALSTVPSVLHEVRI
TDHRRTADEYFVWLNTLMQLK-----GLQGRISEAIISSAPRVVFNLRV
TDPGQTDSIGLRLLEVLRHAG-----LGPADVGCACVASSVVPGVNPLIRR
TNREMLPDDLALQLHGLFTLA-----GAP-IPRAAVLSSVAPPVGENYAL
TGVFQTEDELFSHLHPLLG-----DAMREIKGIGVASVVPVTQNTVIER
PDARKTQDEYSLLIHALCERAG-----VGRASLRDAFISSVVPVLTKTIAD
TNLMRLRYDEVYSSFFEEFNDFN-----VN---K-VFISSVVPILNETFKN
DFLKL SHEEF LKEEF PKLK-----ALGISVKQSFSEKVRG
SGNAPLQTWVTDYNPKSAQLP-----VLLGKVPIMLASVVP
IHFAQNYQLFSSAKEDLKR-----LGIQKEIFYISVNEE
AFDNLDDLALGRWLATLPRRP-----Q-----RALGVNVAGLARGEAIA

MCTKYFHIEPQIVG-PG-MKTGLNLIKYDNPKEVGADRIVNAVAAIHLYG-
MIRKYFKINPLVVG-PG-IKTGINIKYDNPKEVGADRIVNAVAHAHIYK-
VTRRYGDPVPAVLVEPG-VKTGVPIILTDHPKEVGADRIINAVAAVELYG-
MLDQYWPSVPHVLIIEPG-VRTGIPLLVDNPNKEVGADRIVNCLAAAYDRFR-
LCNRYFDCRPYVVGKPG-CELPVAPRVDPGTTVGPDRLVNTVAGYDRHG-
ACERYL--YRKLLFAPGDIAIPLDNRYERP AEVGADRLVAAYAARRLYP-
ALKRRHFMIDAFVSAEN--LPDVTVELDTPGSVGADRLCNLFGAEKYLG-
FSQKYFHI SPIWV KAKN---GCVKWNVKNPSEVGADR VANVAVFVKEYG-
AVAQISGVQP VVFGPWAYEHL PVRIP EPPVRAEIGTDLVANAVAAVHFR-
VIFSFFKIKPLFIGFDLNYDLTFNPKSDKFLLGSDVFANLVAAIENYS-
KIPKIK-----FLKKEN---FPIQVDYKTPETLGTDRVALAYSAKKFYG-
QTEVWRVYQPKILTLKN---LPLVNLYP---SFGIDRALAGLTGLTYG-
NEKALLNCYPNAKNIAG---FFHLETDYVG---LGIDROMACLA---VN---
ATLRAGGCDIRWLRAQP-LAMGLRNGYRNPDLGLGADRWACMVGVLARQPS

. * *

FIG. 6C

B. subtilis | Coax (SEQ ID NO:2)
WIT | RCA03301 | C. acetobutylicum (SEQ ID NO:3)
pir | T36391 | S. coelicolor (SEQ ID NO:4)
sp | O06282 | M. tuberculosis (SEQ ID NO:5)
WIT | RRC02473 | R. capsulatus (SEQ ID NO:6)
dbj | BAA21476.1 | D. vulgaris (SEQ ID NO:59)
sp | Q9RX54 | D. radiodurans (SEQ ID NO:8)
gb | AAD35964.1 | T. maritima (SEQ ID NO:9)
gb | O93446 | T. pallidum (SEQ ID NO:10)
sp | O51477 | B. burgdorferi (SEQ ID NO:11)
sp | O67753 | A. aeolicus (SEQ ID NO:12)
sp | P74045 | Synechocystis (SEQ ID NO:13)
sp | O25533 | H. pylori (SEQ ID Nos:14 or 67)
sp | Q45338 | B. pertussis (SEQ ID NO:15)

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pir | T36391 | S. coelicolor (SEQ ID NO:4)
sp | O06282 | M. tuberculosis (SEQ ID NO:5)
WIT | RRC02473 | R. capsulatus (SEQ ID NO:6)
dbj | BAA21476.1 | D. vulgaris (SEQ ID NO:59)
sp | Q9RX54 | D. radiodurans (SEQ ID NO:8)
gb | AAD35964.1 | T. maritima (SEQ ID NO:9)
gb | O93446 | T. pallidum (SEQ ID NO:10)
sp | O51477 | B. burgdorferi (SEQ ID NO:11)
sp | O67753 | A. aeolicus (SEQ ID NO:12)
sp | P74045 | Synechocystis (SEQ ID NO:13)
sp | O25533 | H. pylori (SEQ ID Nos:14 or 67)
sp | Q45338 | B. pertussis (SEQ ID NO:15)

NP--LIVVDFGTATTYCYIDENKQYMGGAIAPGITISTEALYSRAAKLPR
RS--LIIIDFGTATTFCAVRENGDYLGGAICPGIKVSSEALFEKAAKLPR
GP--AIVVDFGTATTFDAVSARGEYIGGVIAPGIEISVEALGVKGAQLRK
KA--AIVVDFGSSICVDVVSARGEFLGGAIAPGVQVSSDAAAARSAAALRR
GD--LIVVDFGTATTFDVVAPDGAYIGGVIAPGVNLSLEALHMAAALPH
GPRLSVDFGTATTFDCVEG-GAYLGGLICPGVLSSAGALSSRTAKLPR
GLDYAVVDFGTSTNFDVVGRRRFLGGILATGAQVSADALFARAAKLPR
KN--GIIIDMGTATTVDLVVN-GSYEGGAILPGFFMMVHSLFRGTAKLPL
SA--CVVVDCCGTALTFTAVDGTGLIQVAIAPGLRTAVQSLHTGTAQLPL
FEN-VLVVDLGTACTIFAVSRQDGIILGGIINSGPLINFNSLHDNAYLIK
KN--VVVISAGTALVIDLVE-GKFKGGFITLGLGKKILSDLAEGIPE
FP--CLVVDGGTALTITGFDQDKKLVGGAILPGLGLQLATLGDRLAALPK
NG--VVVDAGSAITIDLIKE-GKHLGGCILPGLAQYIHAYKKSAKILEQ
VHPPLLVASFGTATTLDTIGPDNVFPFGLLILPGPAMMRGALAYGTAHLPL

: . *:: . . * : *

IEITRPDN---IIGKNTVSAMQSGILFGYVGQVEGIVKRMKWQAKQDLK-
VELIKPAY---AICKNTISSIQSGIVRYLRQVKYLFKEKLENLPDGRRT
IEVARPRS---VIGKNTVEAMQSGIVYGFAGQVDGVVNRMARELADD--P
VELARPRS---VVGKNTVECMQAGAVFGFAGLVVDGLVGRIREDVSGFSVD
VDVTKPQG---VIGTNTVACIQSGVYWGVIYIGLVEGIVRQIRMERDRP---
ISLEVEEDS-PVIGRSTTSLNHGFI FGFAAMTEGVLA-----
ITLQAPET---AIGKNTVHALQSGLVFGYAEMVDGLLRRIRAEELPGE---
VEVKPADF---VVGKDTREENIRLGVVNGSVYALEGIIIGRIKEVYGDLP--
VPLALPDS---VLGKDTTHAVQAGVVRGTLFVIRAMIAQCQKELGCR---
FPISTPNN---LLERTTSGSVNSGLFYQYKYLIEGVYRDIKQMYKKK---
FFPEEVEI---FLGRSTRECVLGGAYRESTEFIKSTLKLWRKVFKRK---
LEMDDLTELDPDRWALDTPSAIFSGVVYGVVGLGALQSYLQDWQKLFPGA---
PFKALDSL--EVLPKSTRDAVNNGMVLSVIACIQHLAK--NQK-----
ADGLVADY-----PIDTHQAIASGIAAAQAGAIVRQWLAGRQRYQAP--

* : *

FIG. 6D

B. subtilis | Coax (SEQ ID NO:2)
WIT | RCA03301 | C. acetobutylicum (SEQ ID NO:3)
pir | T36391 | S. coelicolor (SEQ ID NO:4)
sp | O06282 | M. tuberculosis (SEQ ID NO:5)
WIT | RRC02473 | R. capsulatus (SEQ ID NO:6)
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gb | AAD35964.1 | T. maritima (SEQ ID NO:9)
gb | O93446 | T. pallidum (SEQ ID NO:10)
sp | O51477 | B. burgdorferi (SEQ ID NO:11)
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sp | P74045 | Synechocystis (SEQ ID NO:13)
sp | O25533 | H. pylori (SEQ ID NOS:14 or 67)
sp | Q45338 | B. pertussis (SEQ ID NO:15)

----VIATGG-----LAPLIANES-----DCIDIVDPFLLTKGLELI
RTSLVLATGG-----LAKLIN-----
DDVTVIATGG-----LAPMVLGES-----SVIDEHFPWLTLMGLRLV
HDVAIVATGH-----TAPLLPEL-----HTVDHYDQHLTLQGLRLV
--MKVVIATGG-----LASLFDLGF-----DLFDKVEDDLTMHGLRLI

--AVAVATGG-----FSRTVQGIC-----QEIDYDETLTLRGLVEL
----VVL TGG-----QSKI VK-DM-----IKHEIFDEDLTIKGVYHF
--CAAVITGG-----LSRLFS-SE-----VDFPPIDAQLTSLGLAHI
--FNLIITGG-----NADLILSLI-----EIEFIFNIHLTVEGVRIL
--FKVVITGG-----EGKYFS-----KFGIYDPLLVHRGMRNL
--AMVITGG-----DGKILHGFLKEHSPNLSVAWDDNLI FLGMAAI
----IYLCGG-----DAKYLSAFL-----PHSVCKERLVDFDGM EIA
--EIYVAGGGWPEVRQEAERLLAVTGAAFGATPQPTYLDSPVLDGLAAL

B. subtilis | Coax (SEQ ID NO:2)
WIT | RCA03301 | C. acetobutylicum (SEQ ID NO:3)
pir | T36391 | S. coelicolor (SEQ ID NO:4)
sp | O06282 | M. tuberculosis (SEQ ID NO:5)
WIT | RRC02473 | R. capsulatus (SEQ ID NO:6)
dbj | BAA21476.1 | D. vulgaris (SEQ ID NO:59)
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gb | AAD35964.1 | T. maritima (SEQ ID NO:9)
gb | O93446 | T. pallidum (SEQ ID NO:10)
sp | O51477 | B. burgdorferi (SEQ ID NO:11)
sp | O67753 | A. aeolicus (SEQ ID NO:12)
sp | P74045 | Synechocystis (SEQ ID NO:13)
sp | O25533 | H. pylori (SEQ ID NOS:14 or 67)
sp | Q45338 | B. pertussis (SEQ ID NO:15)

YERNRVGSV-----

YERNVSRM-----
FERNLEVQGR LKTAR----
FDYNKGLGA-----

WASRSEVR-----
CFGD-----
ARLVPTSLPPATVSGSSGN
GNSIDFKFVN-----
LYLYHRI-----
HHGDRPIC-----
LKKAGILECK-----
AAQGAPTA-----